

Indiana
Curricular Standards
Mathematics - Grade 8
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Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
	Domain: Number Sense			
	<i>Students know the properties of rational* and irrational* numbers expressed in a variety of forms. They understand and use exponents*, power, and roots.</i>			
8.1.1	<ul style="list-style-type: none"> Read, write, compare, and solve problems using decimals in scientific notation*. <i>Example: Write 0.00357 in scientific notation.</i>	Appetizers 1 A; Main Dish Objective 1 (Number Concepts) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.1.2	<ul style="list-style-type: none"> Know that every rational number is either a terminating or repeating decimal and that every irrational number is a non-repeating decimal. <i>Example: Recognize that 2.375 is a terminating decimal, 5.121212. . . is a repeating decimal, and that $\pi = 3.14159265. . .$ is a non-repeating decimal. Name a rational number. Explain your reasoning.</i>	Appetizers 2 A; Main Dish Objective 2 (Mathematical Relations) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.1.3	<ul style="list-style-type: none"> Understand that computations with an irrational number and a rational number (other than zero) produce an irrational number. <i>Example: Tell whether the product of 7 and π is rational or irrational. Explain how you know that your answer is correct.</i>	Appetizers 1 C; 2 A; 13 C; Main Dish Objectives 1 (Number Concepts) Lesson 3; 2 (Mathematical Relations) Lesson 1; 13 (Reasonableness) Lesson 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		

rational number: any number that can be written as a ratio of two integers (e.g., $\frac{1}{2}$, $\frac{5}{6}$, $\frac{23}{9}$)

*irrational number: any number that cannot be written as a ratio of two integers (e.g., π , $\sqrt{3}$, 7π)

*exponent: e.g., the exponent 4 in 3^4 tells you to write four 3s and compute $3 \times 3 \times 3 \times 3$

*scientific notation: a shorthand way of writing numbers using powers of ten (e.g., $300,000 = 3 \times 10^5$, $0.0000005 = 5 \times 10^{-7}$)

Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
8.1.4	<ul style="list-style-type: none"> Understand and evaluate negative integer* exponents. <i>Example: Write 2^{-3} as a fraction.</i> 	Appetizers 1 B; 2 E; Main Dish Objectives 1 (Number Concepts) Lesson 2; 2 (Mathematical Relations) Lesson 5; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.1.5	<ul style="list-style-type: none"> Use the laws of exponents for integer exponents. <i>Example: Write $2^2 \times 2^3$ as $2 \times 2 \times \dots$ and then as a single power of 2. Explain what you are doing.</i> 	Appetizers 1 B; 2 E; 13 C - All Appetizers require explanations and justification of answers; Main Dish Objectives 1 (Number Concepts) Lesson 3; 2 (Mathematical Relations) Lesson 5; 13 (Reasonableness) Lesson 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.1.6	<ul style="list-style-type: none"> Use the inverse relationship between squaring and finding the square root of a perfect square integer. <i>Example: Find the value of $(\sqrt{144})^2$.</i> 	Appetizers 2 A; Main Dish Objective 2 (Mathematical Relations) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.1.7	<ul style="list-style-type: none"> Calculate and find approximations of square roots. <i>Example: For an integer that is not a perfect square, find the two integers (one larger, one smaller) that are closest to its square root and explain your reasoning.</i> 	Appetizers 2 F; Main Dish Objective 2 (Mathematical Relations) Lesson 6; Applications; Final Tests; Reasonableness Problems; Journal Topics		

*integers: $\dots, -3, -2, -1, 0, 1, 2, 3, \dots$

Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
	Domain: Computation			
	<i>Students compute with rational numbers* expressed in a variety of forms. They solve problems involving ratios, proportions, and percentages.</i>			
8.2.1	<ul style="list-style-type: none"> • Add, subtract, multiply, and divide rational numbers (integers*, fractions, and terminating decimals) in multi-step problems. <p><i>Example:</i> $-3.4 + 2.8 \times 5.75 = ?$, $1\frac{4}{5} + -\frac{3}{8} \times 2\frac{2}{9} = ?$, $81.04 \div 17.4 - 2.79 = ?$</p>	Appetizers 6 A; 7 A; 8 A & B; 9 A; Main Dish Objectives 6 (Addition) Lesson 1; 7 (Subtraction) Lesson 1; 8 (Multiplication) Lessons 1 & 2; 9 (Division) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.2.2	<ul style="list-style-type: none"> • Solve problems by computing simple and compound interest. <p><i>Example:</i> You leave \$100 in each of three bank accounts paying 5% interest per year. One account pays simple interest, one pays interest compounded annually, and the third pays interest compounded quarterly. Use a spreadsheet to find the amount of money in each account after one year, two years, three years, ten years, and twenty years. Compare the results in the three accounts and explain how compounding affects the balance in each account.</p>	Appetizers 11 B; Main Dish Objective 11 (Problem Solving) Lesson 2; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.2.3	<ul style="list-style-type: none"> • Use estimation techniques to decide whether answers to computations on a calculator are reasonable. <p><i>Example:</i> Your friend says that 15% of \$25 is \$375. Without solving, explain why you think the answer is wrong.</p>	Appetizers 10 A; 13 A & B; Main Dish Objectives 10 (Estimation) Lesson 1; 13 (Reasonableness) Lessons 1 & 2; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.2.4	<ul style="list-style-type: none"> • Use mental arithmetic to compute with common fractions, decimals, powers, and percents. <p><i>Example:</i> Find 20% of \$50 without using pencil and paper.</p>	Appetizers 11 E; Main Dish Objective 11 (Problem Solving) Lesson 5; Applications; Final Tests; Reasonableness Problems; Journal Topics		

rational number: any number that can be written as a ratio of two integers (e.g., $\frac{1}{2}$, $\frac{5}{6}$, $\frac{23}{9}$)

*integers: ..., -3, -2, -1, 0, 1, 2, 3, ...

Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
	Domain: Algebra and Functions			
	<i>Students solve simple linear equations and inequalities. They interpret and evaluate expressions involving integer* powers. They graph and interpret functions. They understand the concepts of slope* and rate.</i>			
8.3.1	<ul style="list-style-type: none"> Write and solve linear equations and inequalities in one variable, interpret the solution or solutions in their context, and verify the reasonableness of the results. <p><i>Example:</i> As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, solve it, and check that your answer is reasonable.</p>	Appetizers 2 F & G; 12 A; Main Dish Objectives 2 (Mathematical Relations) Lessons 6 & 7; 12 (Mathematical Representation) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.3.2	<ul style="list-style-type: none"> Solve systems of two linear equations using the substitution method and identify approximate solutions graphically. <p><i>Example:</i> Solve the system. $2x + 3y = 6$ $y = 0$</p>	Appetizers 2 G; 12 A; Main Dish Objectives 2 (Mathematical Relations) Lesson 7; 12 (Mathematical Representation) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.3.3	<ul style="list-style-type: none"> Interpret positive integer powers as repeated multiplication and negative integer powers as repeated division or multiplication by the multiplicative inverse. <p><i>Example:</i> Use a spreadsheet to explore the relationship between positive and negative integer powers by making a table of values of powers of 3, from 3^{-5} to 3^5.</p>	Appetizers 2 E; Main Dish Objective 2 (Mathematical Relations) Lesson 5; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.3.4	<ul style="list-style-type: none"> Use the correct order of operations to find the values of algebraic expressions involving powers. <p><i>Example:</i> Use a scientific calculator to find the value of $3(2x + 5)^2$ when $x = -35$.</p>	Appetizers 2 A; Main Dish Objective 2 (Mathematical Relations) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		

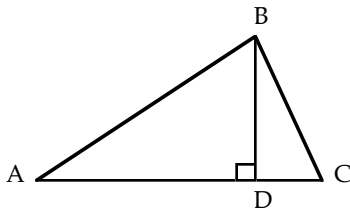
*integers: . . . , -3, -2, -1, 0, 1, 2, 3, . . .

*slope: between any two points on a line, the slope is the change in vertical distance divided by the change in horizontal distance ("rise" over "run")

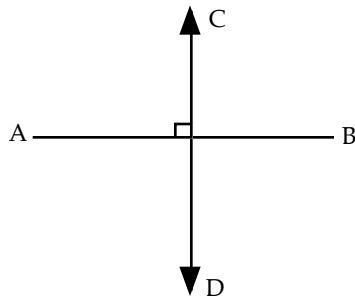
Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
8.3.5	<ul style="list-style-type: none"> Identify and graph linear functions, and identify lines with positive and negative slopes. <p><i>Example:</i> Draw the graphs of $y = 2x - 1$, $y = 3x - 1$, $y = -2x - 1$, $y = -3x - 1$. Find the slope of each graph. What do you notice?</p>	Appetizers 12 B; Main Dish Objective 12 (Mathematical Representation) Lesson 2; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.3.6	<ul style="list-style-type: none"> Find the slope of a linear function given the equation and write the equation of a line given the slope and any point on the line. <p><i>Example:</i> Write an equation of the line with slope 2 and y-intercept -4.</p>	Appetizers 12 C; Main Dish Objective 12 (Mathematical Representation) Lesson 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.3.7	<ul style="list-style-type: none"> Demonstrate an understanding of rate as a measure of one quantity with respect to another quantity. <p><i>Example:</i> A car moving at a constant speed travels 90 km in 2 hours, 135 km in 3 hours, 180 km in 4 hours, etc. Draw a graph of distance as a function of time and find the slope of the graph. Explain what the slope tells you about the movement of the car.</p>	Appetizers 12 C; Main Dish Objective 12 (Mathematical Representation) Lesson 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.3.8	<ul style="list-style-type: none"> Demonstrate an understanding of the relationships among tables, equations, verbal expressions, and graphs of linear functions. <p><i>Example:</i> Write an equation that represents the verbal description: "the perimeter of a square is four times the side length." Construct a table of values for this relationship and draw its graph.</p>	Appetizers 4 D & F; 11 C; 12 C; Main Dish Objectives 4 (Measurement) Lessons 4 & 6; 11 (Problem Solving) Lesson 3; 12 (Mathematical Representation) Lesson 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.3.9	<ul style="list-style-type: none"> Represent simple quadratic functions using verbal descriptions, tables, graphs, and formulas, and translate among these representations. <p><i>Example:</i> Draw the graph of $y = x^2$, $y = 2x^2$, and $y = 3x^2$. Describe their similarities and differences.</p>	Appetizers 11 C; 12 A & B; Main Dish Objectives 11 (Problem Solving) Lesson 3; 12 (Mathematical Representation) Lessons 1 & 2; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.3.10	<ul style="list-style-type: none"> Graph functions of the form $y = nx^2$ and $y = nx^3$ and describe the similarities and differences in the graphs. <p><i>Example:</i> Draw the graphs of $y = 2x^2$ and $y = 2x^3$. Explain which graph shows faster growth.</p>	Appetizers 12 B & C; Main Dish Objective 12 (Mathematical Representation) Lessons 2 & 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		

Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
	Domain: Geometry			
	<i>Students deepen their understanding of plane and solid geometric shapes and properties by constructing shapes that meet given conditions, by identifying attributes of shapes, and by applying geometric concepts to solve problems.</i>			
8.4.1	<ul style="list-style-type: none"> Identify and describe basic properties of geometric shapes: altitudes*, diagonals, angle bisectors, perpendicular bisectors*, central angles*, radii, diameters, and chords* of circles. <p><i>Example: Describe a central angle of a circle in words and draw a diagram.</i></p>	Appetizers 3 A & G; Main Dish Objective 3 (Geometry) Lessons 1 & 7; Applications; Final Tests; Reasonableness Problems; Journal Topics		

*altitude: line segment from vertex of triangle to meet the line containing the opposite side in a right angle (altitude is \overline{BD} in $\triangle ABC$)

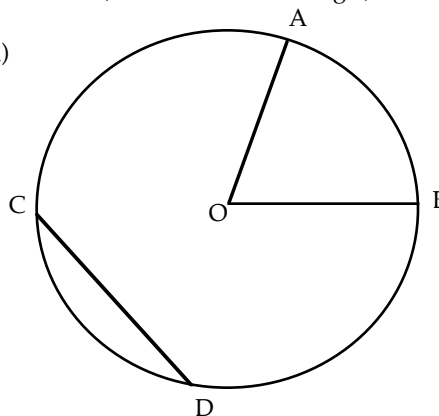


*perpendicular bisector: line (or ray or line segment) at right angles to given line segment and dividing it in half (\overleftrightarrow{CD} is the perpendicular bisector of \overline{AB})



*central angle: angle formed by joining two points on a circle to the center ($\angle AOB$ is a central angle)

*chord: line segment joining two points on a circle (\overline{CD} is a chord)



Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
8.4.2	<ul style="list-style-type: none"> Perform simple constructions such as bisectors of segments and angles, copies of segments and angles, and perpendicular segments. Describe and justify the constructions. <p><i>Example:</i> Explain the procedures used to construct the three angle bisectors of a triangle.</p>	Appetizers 3 A & G; Main Dish Objective 3 (Geometry) Lessons 1 & 7; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.4.3	<ul style="list-style-type: none"> Identify properties of three-dimensional geometric objects (e.g., diagonals of rectangular solids) and describe how two or more figures intersect in a plane or in space. <p><i>Example:</i> Find two lines in your classroom that are not parallel, yet do not meet.</p>	Appetizers 3 B; 11 D; Main Dish Objectives 3 (Geometry) Lesson 2; 11 (Problem Solving) Lesson 4; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.4.4	<ul style="list-style-type: none"> Draw the translation (slide), rotation (turn), reflection (flip), and dilation (stretches and shrinks) of shapes. <p><i>Example:</i> Draw a rectangle and slide it 3 inches horizontally across your page. Then rotate it clockwise through 90° about the bottom left vertex. Draw the new rectangle in a different color.</p>	Appetizers 3 H; 11 D; Main Dish Objectives 3 (Geometry) Lesson 8; 11 (Problem Solving) Lesson 4; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.4.5	<ul style="list-style-type: none"> Use the Pythagorean Theorem and its converse to solve problems in two and three dimensions. <p><i>Example:</i> Measure the dimensions of a shoe box and calculate the length of a diagonal from the top right to the bottom left of the box. Measure with a string to evaluate your solution.</p>	Appetizers 3 C & D; 11 D; Main Dish Objectives 3 (Geometry) Lessons 3 & 4; 11 (Problem Solving) Lesson 4; Applications; Final Tests; Reasonableness Problems; Journal Topics		

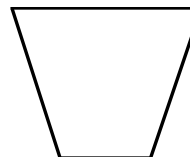
Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
	Domain: Measurement			
	<i>Students convert between units of measure and use rates and scale factors to solve problems. They compute the perimeter, area, and volume of geometric objects. They investigate how perimeter, area, and volume are affected by changes of scale.</i>			
8.5.1	<ul style="list-style-type: none"> Convert common measurements for length, area, volume, weight, capacity, and time to equivalent measurements within the same system. <p><i>Example:</i> The area of a hall is 40 square yards. What is the area in square feet?</p>	Appetizers 4 B & C; Main Dish Objective 4 (Measurement) Lessons 2 & 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.5.2	<ul style="list-style-type: none"> Solve simple problems involving rates and derived measurements for such attributes as velocity and density. <p><i>Example:</i> A car travels at 60 mph for 20 minutes. How far does it travel? What units are appropriate for distance? Explain your answer.</p>	Appetizers 4 A; 11 C; Main Dish Objectives 4 (Measurement) Lesson 1; 11 (Problem Solving) Lesson 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.5.3	<ul style="list-style-type: none"> Solve problems involving scale factors, area, and volume using ratio and proportion. <p><i>Example:</i> Calculate the volume and surface area of cubes with side 1 cm, 2 cm, 3 cm, etc. Make a table of your results and describe any patterns in the table.</p>	Appetizers 4 E & F; Main Dish Objective 4 (Measurement) Lessons 5 & 6; Applications; Final Tests; Reasonableness Problems; Journal Topics		

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8.5.4	<ul style="list-style-type: none"> Use formulas for finding the perimeter and area of basic two-dimensional shapes and the surface area and volume of basic three-dimensional shapes, including rectangles, parallelograms*, trapezoids*, triangles, circles, prisms*, cylinders, spheres, cones, and pyramids. <p>Example: Find the total surface area of a right triangular prism 14 feet high and with a base that measures 8 feet by 6 feet.</p>	Appetizers 4 D, E, & F; 11 C; Main Dish Objectives 4 (Measurement) Lessons 4, 5, & 6; 11 (Problem Solving) Lesson 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.5.5	<ul style="list-style-type: none"> Estimate and compute the area and volume of irregular two- and three-dimensional shapes by breaking the shapes down into more basic geometric objects. <p>Example: Find the volume of a dog house that has a rectangular space that is 3 ft by 2 ft by 5 ft and has a triangular roof that is 1.5 ft higher than the walls of the house.</p>	Appetizers 4 E; 11 C; Main Dish Objectives 4 (Measurement) Lesson 5; 11 (Problem Solving) Lesson 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		

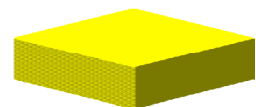
*parallelogram: a four-sided figure with both pairs of opposite sides parallel



*trapezoid: a four-sided figure with one pair of opposite sides parallel



*prism: solid shape with fixed cross-section (right prism is a solid shape with two parallel faces that are polygons and other faces that are rectangles)



Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
	Domain: Data Analysis and Probability			
	<i>Students collect, organize, represent, and interpret relationships in data sets that have one or more variables. They determine probabilities and use them to make predictions about events.</i>			
8.6.1	<ul style="list-style-type: none"> Identify claims based on statistical data and, in simple cases, evaluate the reasonableness of the claims. Design a study to investigate the claim. <p><i>Example:</i> A study shows that teenagers who use a certain brand of toothpaste have fewer cavities than those using other brands. Describe how you can test this claim in your school.</p>	Appetizers 5 D; 11 E; Main Dish Objectives 5 (Probability/Statistics) Lesson 4; 11 (Problem Solving) Lesson 5; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.6.2	<ul style="list-style-type: none"> Identify different methods of selecting samples, analyzing the strengths and weaknesses of each method, and the possible bias in a sample or display. <p><i>Example:</i> Describe possible bias in the following survey: A local television station has a daily call-in poll. Viewers of the morning and noon newscasts are asked to call one telephone number to answer "yes" and a different telephone number to answer "no." The results are reported on the six-o'clock newscast.</p>	Appetizers 5 A & B; 11 E; Main Dish Objectives 5 (Probability/Statistics) Lessons 1 & 2; 11 (Problem Solving) Lesson 5; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.6.3	<ul style="list-style-type: none"> Understand the meaning of, and be able to identify or compute the minimum value, the lower quartile*, the median*, the upper quartile*, the interquartile range, and the maximum value of a data set. <p><i>Example:</i> Arrange a set of test scores in increasing order and find the lowest and highest scores, the median, and the upper and lower quartiles.</p>	Appetizers 5 C; 11 E; Main Dish Objectives 5 (Probability/Statistics) Lesson 3; 11 (Problem Solving) Lesson 5; Applications; Final Tests; Reasonableness Problems; Journal Topics		

*lower quartile: the value that separates the lowest one-fourth of the values from the rest of the values

*median: the value that divides a set of data written in order of size into two equal parts

*upper quartile: the value that separates the highest one-fourth of the values from the rest of the values

Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
8.6.4	<ul style="list-style-type: none"> Analyze, interpret, and display single- and two-variable data in appropriate bar, line, and circle graphs, stem-and-leaf plots* and box-and-whisker plots*, and explain which types of display are appropriate for various data sets. <p>Example: The box-and-whisker plots below show winning times (hours:minutes) for the Indianapolis 500 race in selected years:</p> <p>2:40 2:50 3:00 3:10 3:20 3:30 3:40 3:50 4:00</p> <p>1981 - 1995 1966 - 1980* 1951 - 1965</p> <p>*Except 1967, 1973, 1975, and 1976.</p> <p>In the years from 1951-1965, the slowest time was 3 h 57 min. Explain how the slowest time changed through the years 1951-1995. How did winning times change during that period? How did the median times change in the same period?</p>	Appetizers 12 B & C; Main Dish Objective 12 (Mathematical Representation) Lessons 2 & 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.6.5	<ul style="list-style-type: none"> Represent two-variable data with a scatterplot* on the coordinate plane and describe how the data points are distributed. If the pattern appears to be linear, draw a line that appears to best fit the data, and write the equation of that line. <p>Example: Survey some of the students at each grade level in your school, asking them how much time they spend on homework. Plot the grade level and time of each student as a point (grade, time) on a scatter diagram. Describe and justify any relationship between grade and time spent on homework.</p>	Appetizers 12 B & C; Main Dish Objective 12 (Mathematical Representation) Lessons 2 & 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		

*stem-and-leaf plot: e.g., the one shows 62, 63, 67, 71, 75, 76, etc.

Stem	Leaf
6	2 3 7
7	1 5 5 6 8 9
8	0 1 1 2 3 5 5 7 8 8
9	1 2 2 3 3 4

*box-and-whisker plot: diagram showing median, quartiles, and range (see diagram on previous page)

*scatterplot: a coordinate graph showing ordered pairs of data

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8.6.6	<ul style="list-style-type: none"> Understand and recognize equally likely events. <p><i>Example:</i> When you roll a number cube, what is the probability that the number on the top face will be a 6? Explain your answer.</p>	Appetizers 5 A & B; Main Dish Objective 5 (Probability/Statistics) Lessons 1 & 2; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.6.7	<ul style="list-style-type: none"> Find the number of possible arrangements of several objects by using the Basic Counting Principle. <p><i>Example:</i> You are planning to place four pictures in a line on a shelf. Find the number of ways you can arrange the four pictures.</p>	Appetizers 5 A; 11 E; Main Dish Objectives 5 (Probability/Statistics) Lesson 1; 11 (Problem Solving) Lesson 5; Applications; Final Tests; Reasonableness Problems; Journal Topics		
Domain: Problem Solving				
<i>Students make decisions about how to approach problems and communicate their ideas.</i>				
8.7.1	<ul style="list-style-type: none"> Analyze problems by identifying relationships, telling relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns. <p><i>Example:</i> Solve the problem: “For computers, binary numbers are great because they are simple to work with and they use just two values of voltage, magnetism, or other signal. This makes hardware easier to design and more noise resistant. Binary numbers let you represent any amount you want using just two digits: 0 and 1. The number you get when you count ten objects is written 1010. In expanded notation, this is $1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$. Write the number for thirteen in the binary (base 2) system.” Decide to make an organized list.</p>	Appetizers 11 A; 12 A; Main Dish Objectives 11 (Problem Solving) Lesson 1; 12 (Mathematical Representation) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		

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8.7.2	<ul style="list-style-type: none"> • Make and justify mathematical conjectures based on a general description of a mathematical question or problem. <p><i>Example:</i> In the first example, if you have only two symbols, 0 and 1, then one object: 1, two objects: 10, three objects: 11, four objects: 100. Predict the symbol for five objects.</p>	Appetizers 11 F; 12 C; Main Dish Objectives 11 (Problem Solving) Lesson 6; 12 (Mathematical Representation) Lesson 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.7.3	<ul style="list-style-type: none"> • Decide when and how to divide a problem into simpler parts. <p><i>Example:</i> In the first example, write expanded notation for the number five in base 2; begin with the fact that $5 = 4 + 1$.</p>	Appetizers 13 A, B, & C; Main Dish Objective 13 (Reasonableness) Lessons 1, 2, & 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
Students use strategies, skills, and concepts in finding and communicating solutions to problems.				
8.7.4	<ul style="list-style-type: none"> • Apply strategies and results from simpler problems to solve more complex problems. <p><i>Example:</i> In the first example, write the first five numbers in base 2 notation and look for a pattern.</p>	Appetizers 13 A; Main Dish Objective 13 (Reasonableness) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.7.5	<ul style="list-style-type: none"> • Make and test conjectures by using inductive reasoning. <p><i>Example:</i> In the first example, predict the base 2 notation for six objects, then use expanded notation to test your prediction.</p>	Appetizers 11 A; 13 A; Main Dish Objectives 11 (Problem Solving) Lesson 1; 13 (Reasonableness) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.7.6	<ul style="list-style-type: none"> • Express solutions clearly and logically by using the appropriate mathematical terms and notation. Support solutions with evidence in both verbal and symbolic work. <p><i>Example:</i> In the first example, explain how you will find the base two notation for thirteen objects.</p>	Appetizers 12 C; 13 C; Main Dish Objectives 12 (Mathematical Representation) Lesson 3; 13 (Reasonableness) Lesson 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.7.7	<ul style="list-style-type: none"> • Recognize the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy. <p><i>Example:</i> Measure the length and width of a basketball court. Use the Pythagorean Theorem to calculate the length of a diagonal. How accurately should you give your answer?</p>	Appetizers 10 A; 13 A; Main Dish Objectives 10 (Estimation) Lesson 1; 13 (Reasonableness) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		

Benchmark Number	Benchmark • Teaching Targets	Gourmet Resource	Tested	Taught
8.7.8	<ul style="list-style-type: none"> Select and apply appropriate methods for estimating results of rational-number computations. <p><i>Example:</i> Use a calculator to find the cube of 15. Check your answer by finding the cubes of 10 and 20.</p>	Appetizers 10 A; Main Dish Objective 10 (Estimation) Lesson 1; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.7.9	<ul style="list-style-type: none"> Use graphing to estimate solutions and check the estimates with analytic approaches. <p><i>Example:</i> Use a graphing calculator to draw the straight line $x + y = 10$. Use this to estimate solutions of the inequality $x + y > 10$ by testing points on each side of the line.</p>	Appetizers 13 B; Main Dish Objective 13 (Reasonableness) Lesson 2; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.7.10	<ul style="list-style-type: none"> Make precise calculations and check the validity of the results in the context of the problem. <p><i>Example:</i> In the first example, list the first thirteen numbers in base 2 notation. Use patterns or expanded notation to confirm your list.</p>	Appetizers 13 A & C; Main Dish Objective 13 (Reasonableness) Lessons 1 & 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
<p><i>Students determine when a solution is complete and reasonable, and move beyond a particular problem by generalizing to other situations.</i></p>				
8.7.11	<ul style="list-style-type: none"> Decide whether a solution is reasonable in the context of the original situation. <p><i>Example:</i> In the basketball court example, does the accuracy of your answer depend on your initial measuring?</p>	Appetizers 13 A, B, & C; Main Dish Objective 13 (Reasonableness) Lessons 1, 2, & 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		
8.7.12	<ul style="list-style-type: none"> Note the method of finding the solution and show a conceptual understanding of the method by solving similar problems. <p><i>Example:</i> In the first example, use your list of base 2 numbers to add numbers in base 2. Explain exactly how your addition process works.</p>	Appetizers 13 A & C; Main Dish Objective 13 (Reasonableness) Lessons 1 & 3; Applications; Final Tests; Reasonableness Problems; Journal Topics		